REMARKS

Claims 1-7, 10, 11, 13-15 and 17-24 are presently pending in the application.

In the specification, the paragraph at page 27, lines 3-22 has been amended to correct several typographical errors. For example, in line 6, "lubricants" has been corrected to "moisture control additives." One skilled in the art would understand that diethylene glycol monoalkylethers are moisture control additives, rather than lubricants. Additional minor grammatical errors have also been corrected. No new matter has been added by these amendments.

Additionally, claims 1, 17 and 20 have been amended to recite that the cutting or grinding oil composition comprises 20 to 100 percent by mass of an ester, 0 to 50 percent by mass of an oiliness improver, 0 to 10 percent by mass of an oxidation inhibitor, and 0 to 70 percent by mass of a base oil based on a total mass of the composition. Support for these amendments may found in the specification at least at page 17, lines 1-7 and page 26, last line to page 27, second line (ester); page 17, lines 11-13, page 24, lines 15-20 and page 26, lines 4-10 (oiliness improver); page 25, line 20 to page 6, line 10 (oxidation inhibitor), and page 26, last five lines (base oil). Claims 9 and 12 have been canceled, and claims 10, 11 and 13-15 have been amended to depend from claim 1 and to make other minor changes. Minor amendments have also been made to claims 18 and 19.

Finally, new claims 21-24 have been added. Claims 21-23 recite the particular types of esters which may be included in the cutting or grinding oil composition. Claim 21 is supported in the specification at least at page 6, last four lines and at page 7, line 20 to page 8, line 16; claim 22 is supported at least at page 6, last four lines and at page 8, line 17 to page 9, line 2; and claim 23 is supported at least at page 6, last four lines and at page 9, lines 3-6. Finally, claim 24 recites that the cutting or grinding oil composition may comprise at least one additive, which is supported in the specification at least at page 26, lines 7-10 and page 27, lines

3-22. No new matter has been added by these amendments.

In Paper No. 9, the Examiner has formally rejected claims 1-7, 9-15, and 17-20 under 35 U.S.C. § 112, second paragraph, as being indefinite. The Examiner argues that in independent claims 1, 17, and 20, which only recite that the composition comprises at least 20 percent by mass of an ester, it is not clear what comprises the remainder of the composition. By this Amendment, claims 1, 17 and 20 have been amended to specify that the cutting or grinding oil compositions according to the invention comprise 20 to 100 percent by mass of an ester, 0 to 50 percent by mass of an oiliness improver, 0 to 10 percent by mass of an oxidation inhibitor, and 0 to 70 percent by mass of a base oil based on a total mass of the composition. These amendments overcome the formal rejection, and reconsideration and withdrawal of the § 112 rejection are respectfully requested.

The Examiner has also rejected claims 1-7 and 9-15 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,756,430 of Zielinski ("Zielinski") in view of U.S. Patent No. 6,085,782 of Ott ("Ott"). The Examiner has maintained her rejection of claims 1-7, 9-15 and 17-20 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,171,903 of Koyama, *et al.* ("Koyama") in combination with Ott. Applicants respectfully traverse these rejections and the arguments in support thereof, and respectfully request reconsideration and withdrawal of the rejections.

Rejection Under § 103(a) Based on Zielinski and Ott

The Examiner argues that Zielinski discloses a mist oil lubricant which distributes fine droplets of oil compositions in aerosol form to the areas of various machine elements to be lubricated. The compositions allegedly comprises: (A) 90-95 weight percent of an ester oil having a viscosity of 10-150 cSt at 40°C; (B) 3-5 percent of an additive selected from rust inhibitors, corrosion inhibitors, anti-wear agents, anti-foam agents, antioxidants, demulsifiers,

extreme pressure agents and mixtures thereof; and (C) 1-5 percent of a polyisobutylene stray mist suppressant. The Examiner contends that the mist oil lubricant of Zielinski meets the limitation of the claimed cutting and grinding oil compositions which have a kinematic viscosity of 1 to 100 mm^2/sec at 40°C. Further, the Examiner cites Ott as allegedly teaching that "minimal quantity lubrication" is known in the lubricant art for tool working and that oil compositions can be supplied to workpieces in an amount of 20 ml per hour. Therefore, the Examiner concludes that the mist oil lubricant of Zielinski could be applied to a workpiece in such a manner if so desired. Applicants respectfully traverse this rejection as follows.

The present invention is directed to a cutting oil or grinding oil composition which may be advantageously utilized in a minimal lubrication system. In general, oil compositions for cutting or grinding have the tendency to gradually deteriorate during use, and finally become unusable. The used compositions must then be discarded as waste. Although the use of a minimal quantity lubrication system helps to reduce the waste, it does not solve the above problems. Consequently, it is desirable to utilize biodegradable oil compositions which are easily decomposable by microorganisms and which reduce the undesirable harmful influence on the environment. Additionally, desirable compositions are easy to supply to the portion of a metal to be worked and provide low stickiness and favorable lubricating properties. Applicants have found that oil compositions containing 20 to 100 mass % of an ester and having a kinematic viscosity of 1 to 100 mm^2/s at 40 °C achieve these objectives.

In contrast, although Zielinski teaches oil compositions comprising 90-95 percent by weight of an ester oil have a viscosity of 10-150 cSt at 40°C, such compositions are described for mist lubrication and can distribute fine droplets of oil compositions in aerosol form to machine elements, such as test bearings (col. 4, lines 36-39). Zielinski does not teach or suggest the application of the oil composition to metal working, in particular cutting and grinding. Therefore, not only does Zielinski not teach a cutting or grinding composition (claim 1), but also

does not teach or suggest supplying an oil composition to the cutting or grinding spot of a work (claim 17), or a method which involves cutting or grinding a work such that the work has a cutting or grinding spot (claim 20). In fact, Zielinski is totally silent as to cutting and grinding.

Further, Zielinski does not teach or suggest that the oil composition has a kinematic viscosity of 1 to 100 mm^2/s (cSt) at 40 °C as claimed, or that such would be desirable. Rather, Zielinski only teaches the kinematic viscosity of the base oil (col. 2, lines 23-26), but does not suggest the kinematic viscosity of the composition, which further contains, in addition to the base oil, an additive and a polyisobutylene stray mist suppressant (which together comprise up to 10% of the total weight of the composition). Therefore, Zielinski does not teach or suggest all of the claimed elements. Further, since Zielinski does not teach or suggest metal working (or more specifically cutting and grinding), one of ordinary skill in the art would not be motivated to combine Zielinski and Ott. The Examiner has not specifically set forth how Ott would be applied to Zielinski but even if the proposed combination with Ott were valid, it would still not cure the deficiencies in Zielinski. Accordingly, since no *prima facie* case of obviousness has been established by the Examiner based on the proposed combination of Zielinski and Ott, reconsideration and withdrawal of the rejection are respectfully requested.

Rejection Under § 103(a) Based on Koyama and Ott

The Examiner maintains that Koyama teaches a lubricating oil composition for plastic working, metal working or for cutting and grinding which comprises: (i) a linear olefin having 6 to 40 carbon atoms as a base oil; (ii) at least one alcohol, glycol, polyalkylene glycol, or a derivative of polyethylene glycol or fatty acid, and (iii) at least one phenolic or amine compound. Component (ii) allegedly includes fatty acid esters of polyethylene glycol which may be added to the composition in an amount of 0.05 to 50 weight % of the entire composition. The Examiner contends that the ester component of Koyama meets the limitations of the claimed

ester component. The composition of Koyama also allegedly includes alkyl-substituted phenols as component (iii) in an amount of 0.1 to 2.0 weight % based on the entire composition, which is alleged to meet the limitation of the oiliness component of the claims according to (D) in claim 10. The Examiner argues that the composition of Koyama can also be blended with a suitable quantity of well known oiliness agents, extreme-pressure agents, rust inhibitors, corrosion inhibitors, and the like, and thus meets the claimed limitations of the cutting and grinding oil composition. Finally, the Examiner again cites Orr for teaching "minimal quantity lubrication" and concludes that the cutting and grinding oil composition of Koyama can be applied to a workpiece in such a manner if so desired. Applicants respectfully traverse this rejection for the reasons set forth in the Amendment filed June 26, 2002, which Applicants rely upon in full, and for the additional reasons set forth below.

First, although Koyama teaches that component (ii) may be a fatty acid ester of polyethylene glycol, all of the compositions used in the cutting test (col. 19, lines 21-32) contain an alcohol rather than an ester component (Table 12). Further, in Examples 44-47 and Comparative Examples 19-22 (col. 22, line 63 to col. 23, line 17 and Table 14), each of the compositions subjected to a cutting test does not contain an ester. Therefore, it would not be expected based on Koyama that an ester, which is not included in any of the compositions used for cutting, would be a desirable component which would have a favorable effect on the properties of the composition.

Additionally, the Examiner still has not met her burden of showing that the motivation to make the proposed combination of Koyama and Ott is found in Koyama. In comparison with the composition of Koyama, Ott teaches a device for transferring fluid from a stationary to a rotating machine part. Ott describes minimal quantity lubrication, which is explained to be useful for drills or milling tools. However, the lubricating oil composition of Koyama is designed to form an excellent surface for the material to be worked and further to

improve the rust and wear resistance of the working tools (column 2, lines 7-10 and column 1, lines 21-25). There is nothing in Koyama to suggest using such a composition in a minimal quantity lubricating device, and there is thus no motivation to make the proposed combination with Ott.

Consequently, the proposed combination of Koyama and Ott is not valid. However, even if the combination were valid, it would not teach or suggest all of the claimed elements. Specifically, even the combination would not teach or suggest utilizing a minimal quantity lubrication system for cutting or grinding, the appropriate percentage of ester to use in such an application, or the desired kinematic viscosity, and thus would not teach or suggest the elements of the claims. Therefore, a *prima facie* case of obviousness has still not been established by the Examiner.

Applicants note that the Examiner has not addressed Applicants' previous arguments regarding the differences between Koyama and the claimed invention, particularly that Koyama does not teach or suggest the claimed kinematic viscosity of the composition or the elements recited in the dependent claims. For example, claims 2-5 recite various properties of the ester component, including iodine value, bromine value, hydroxyl value, and saponification value, none of which is taught or suggested by Koyama. Further, Koyama does not teach the addition of an oxidation inhibitor such as those described in claims 13-15. Rather, Koyama merely teaches in column 17, line 51 to column 18, line 2 that oiliness agents, extreme-pressure agents, rust inhibitors or defoaming agents may be added.

Rather than responding to Applicants' previous arguments, the Examiner merely states in the present Office Action that the arguments "have been fully considered but are not persuasive," and has made the present Office Action final. In a final office action, "the final rejection... should include a rebuttal of any arguments raised in the applicants' reply" (M.P.E.P. § 706.07). Furthermore, when responding to a communication from an applicant, the Examiner

should answer all of the material traversed. In particular:

> Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant's argument and answer the substance of it. (M.P.E.P § 707.07(f)).

Accordingly, the Examiner has not properly responded to Applicants previous response, and if the Examiner is to maintain the rejection based on Koyama in view of Ott, a detailed rebuttal of Applicants' arguments filed in the Amendment of June 26, 2002 and the present Amendment is respectfully requested.

Finally, even if a *prime facie* case of obviousness had been established by the Examiner, the compositions according to the present invention, which contain 20-100% by mass of an ester and have a kinematic viscosity of 1 to 100 mm^2/s at 40°, have desirable properties which are exemplified in the inventive examples. For example, as seen in Example 1 (especially Table 1 at page 30), an oil composition having a kinematic viscosity at 40 °C of 19.1 mm^2/s exhibited excellent lubricating properties, made the finished surface smooth, and prevented the wearing of tools. Additionally, the environmental hazard of such a composition was low. Further, the composition of Example 2, as shown in Table 2 at page 34, displayed low stickiness. These favorable results would not be expected based on the cited prior art references and thus would overcome any case of *prima facie* obviousness. Accordingly, reconsideration and withdrawal of the § 103(a) rejections are respectfully requested.

In view of the foregoing amendments, it is submitted that the pending claims are in compliance with § 112. Based on the remarks, Applicants respectfully submit that the pending claims are patentable over the cited prior art and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

HIDEO YOKOTA ***ET AL***

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(Date)

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Encl: RCE, Extension of Time (two months)

Mark-Up Version of Specification Paragraph and Claims 1, 10, 11, 13, 14, 15, and 17-20

Please amend the paragraph at page 27, lines 3-22 to read as follows:

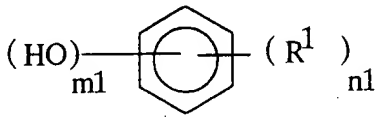
--Examples of conventional additives which may be added to the oil composition are chloric-, sulfuric-, phosphoric-, and organic metallic- extreme pressure additives; [lubricants] moisture control additives, such as diethylene glycol monoalkylethers; film forming agents, such as acrylic polymers, paraffin waxes, microwaxes, slack waxes, and polyolefin waxes; water substituting agents, such as fatty acid amine salts; solid lubricants, such as graphite, graphite fluoride, molybdenum disulfide, boron nitride, and polyethylene powder; corrosion inhibitors, such as amines, alkanolamines, amides, carboxylic acids, carboxylates, sulfonates, phosphoric acid, and phosphate; metal deactivators, such as benzotriazole and thiadiazole; antifoamers, such as methylsilicone, fluorosilicone, and polyacrylates; and ashless dispersants, such as alkenylsuccinimides, benzylamines, and polyalkenylamineaminoamide. No particular limitation is imposed on the content of these known additives. However, the additives [is] are generally added such that that total amount thereof is within the range of 0.1 to 10 percent by mass, based on the total mass of the oil composition.--

--1. (Twice Amended) A cutting or grinding oil composition for a minimal quantity lubrication system comprising [at least] 20 to 100 percent by mass of an ester, 0 to 50 percent by mass of an oiliness improver, 0 to 10 percent by mass of an oxidation inhibitor, and 0 to 70 percent by mass of a base oil based on a total [amount] mass of the composition, wherein the composition has a kinematic viscosity of 1 to 100 mm^2/s at 40 °C.

10. (Amended) The oil composition according to claim [9] 1, wherein said oiliness improver[s are] is selected from the group consisting of (A) alcohols, (B) carboxylic acids, (C) sulfides of unsaturated carboxylic acids, (D) compounds represented by formula (1)

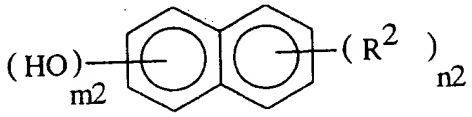
given below, (E) compounds represented by formula (2) given below, (F) polyoxyalkylene compounds, and (G) esters;

said formula (1) being represented by the formula



(1)

wherein R^1 is a hydrocarbon group having 1 to 30 carbon atoms, m1 is an integer from 1 to 6, and n1 is an integer from 0 to 5; and said formula (2) being represented by the formula



(2)

wherein R^2 is a hydrocarbon group having 1 to 30 carbon atoms, m2 is an integer from 1 to 6, and n2 is an integer from 0 to 5.

11. (Amended) The oil composition according to claim [9] 1, wherein said oiliness improver[s are] is contained in an amount of 0.1 to 50 percent by mass, based on the total mass of the composition.

13. (Amended) The oil composition according to claim [12] 1, wherein said oxidation inhibitor is [are] one or more compounds selected from the group consisting of L-ascorbic [L-ascoribic] acid (vitamin C), fatty acid ester of L-ascorbic [L-ascoribic] acid, tocopherol (vitamin E), 2,6-di-tert-butyl-p-cresol (DBPC), 3,5-di-tert-butyl-4-hydroxyanisole, 2-tert-butyl-4-hydroxyanisole, 3-tert-butyl-4-hydroxyanisole, 1,2-dihydro-6-ethoxy-2,2,4-trimethylquinoline (ethoxyquin), 2-(1,1-dimethyl)-1,4-benzenediole (TBHQ), and 2,4,5-trihydroxybutyrophenone (THBP).

14. (Amended) The oil composition according to claim [12] 1, wherein said oxidation inhibitor[s are] is one or more compounds selected from the group consisting of L-

ascorbic [L-ascoribic] acid (vitamin C), fatty acid ester of L-ascorbic [L-ascoribic] acid, tocopherol (vitamin E), 2,6-di-tert-butyl-p-cresol (DBPC) and 3,5-di-tert-butyl-4-hydroxyanisole.

15. (Amended) The oil composition according to claim [12] 1, wherein said oxidation inhibitor[s are] is contained in an amount of 0.1 to 10 percent by mass, based on the total mass of the composition.

17. (Amended) A minimal quantity lubrication system for cutting or grinding which comprises supplying together with a compressed fluid an oil composition in a quantity of 0.001 ml/minute to 1 ml/minute to the cutting or grinding spot of a work, wherein the oil composition comprises [at least] 20 to 100 percent by mass of an ester, 0 to 50 percent by mass of an oiliness improver, 0 to 10 percent by mass of an oxidation inhibitor, and 0 to 70 percent by mass of a base oil based on a total [amount] mass of the composition, and the composition has a kinematic viscosity of 1 to 100 mm^2/s at 40 °C.

18. (Amended) [A] The cutting or grinding oil composition according to claim 1, wherein said ester is contained in an amount of at least 30 percent by mass based on the total [amount] mass of the composition.

19. (Amended) [A] The cutting or grinding oil composition according to claim 1, wherein said ester is contained in an amount of at least 50 percent by mass based on the total [amount] mass of the composition.

20. (Amended) A method for cutting or grinding a work which comprises:

(a) cutting or grinding a work such that the work has a cutting or grinding spot; and

(b) supplying to the cutting or grinding spot of the work an oil composition from a minimal quantity lubrication system wherein the minimal quantity lubrication system comprises supplying together with a compressed fluid the oil composition in a quantity of 0.001 ml/minute to 1 ml/minute; wherein the oil composition comprises [at least] 20 to 100 percent by mass of an

ester, 0 to 50 percent by mass of an oiliness improver, 0 to 10 percent by mass of an oxidation inhibitor, and 0 to 70 percent by mass of a base oil based on a total amount of the composition, and wherein the composition has a kinematic viscosity of 1 to 100 mm^2/s at 40 °C.--